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(54) INK JET RECORDING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an ink composition that is used for an ink jet recording system and improved in high speed and high reliability printing characteristics and high weatherability.

SOLUTION: In an ink jet printer having curing characteristics by irradiating light such as UV rays or electron rays, a recording condition or an ink composition having the peak of absorbance at $810 \pm 5 \text{ cm}^{-1}$ in the infrared spectrum being not more than 20% of that of before irradiation is used. One of the ink composition comprises urethane acrylate and 1-20 wt% pigment as a colorant.

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CLAIMS

[Claim(s)]

[Claim 1] The ink jet record approach characterized by using the ink constituent and the record conditions that the peak value of the absorbance in wave number $810 \pm 5 \text{ cm}^{-1}$ of the infrared spectrum of said formed image becomes 20% or less before an optical exposure, in the ink jet record approach which forms an image using the ink constituent which has the property hardened by irradiating light, such as ultraviolet rays and an electron ray.

[Claim 2] The ink jet record approach according to claim 1 characterized by said ink constituent containing a pigment one to 20.0% of the weight as a coloring material further including urethane acrylate.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the ink constituent used for example, for an ink jet recording device.

[0002]

[Description of the Prior Art] As an ink constituent for ink jet record, the water-soluble liquid ink constituent is used widely conventionally. Moreover, liquefy with heating etc. and a certain energy is made to add and inject using the hot melt mold ink constituent made from the solid wax etc. at the room temperature, and the hot melt mold ink jet recording method which carries out cooling solidification and forms a record dot is proposed, adhering on a record medium.

[0003] Since it does not become dirty at the time of handling since this ink is a solid-state-like at a room temperature, and evaporation of the ink at the time of melting is made as for it to the minimum, it does not have the blinding of a nozzle. Furthermore, in order to solidify immediately after adhesion, there is "no blot", and there is an advantage of being able to use various record media, such as drawing paper and a postcard, without pretreatment etc. from Japanese paper. The ink constituent which provides U.S. Pat. No. 4,391,369 and No. 4,484,948 with good printing quality regardless of quality of paper is described.

[0004] Moreover, it sets to JP,56-93776,A, As it is indicated in the adhesive good ultraviolet-rays hardening resin mold ink constituent in the metal side and is indicated by U.S. Pat. No. 4,228,438 as ink for ink jet record further hardened by exposing ultraviolet rays Epoxy denaturation acrylic resin and urethane denaturation acrylic resin are used as a binder. And ink which used the pigment with a particle diameter of 5 microns or less as the coloring component or ink which used for the binder the epoxy resin of the cationic polymerization nature currently indicated by JP,58-32674,A, There are some which used water solubility or a nonaqueous solubility color, and what made easy printing to a regular paper and recycled paper is indicated as indicated by JP,5-186725,A.

[0005] On the other hand, as an image formation method to a plastic plate, what used the sublimability color for ultraviolet curing mold resin is known as indicated by JP,52-142516,A. The ultraviolet curing mold resin constituent coated with an ink jet recording method is indicated by JP,9-183927,A. In JP,9-165540,A, what lost the blinding of a nozzle in a pigment and the drainage system ink containing ultraviolet-rays hardening resin is indicated.

[0006] On the other hand, in order to improve the weatherability of printed matter, it is common to use a pigment as a coloring agent of ink, and it is used as ink of various kinds of printers, such as a laser beam printer, a melting imprint mold printer, a liquid ink jet printer, and a solid ink jet printer.

[0007] For example, many reports, such as JP,3-37278,A, JP,4-339871,A, JP,5-16343,A, JP,5-105832,A, JP,6-49400,A, JP,6-228479,A, JP,6-228480,A, JP,6-306319,A, JP,7-109432,A, JP,7-196968,A, JP,7-278477,A, JP,7-306319,A, JP,7-316479,A, JP,7-331141,A, JP,8-295836,A, and an official report, are made about pigment ink.

[0008]

[Problem(s) to be Solved by the Invention] Also when printing is difficult and uses a form chiefly to the recorded body which does not have ink absorptivity when said drainage system ink is used for printing, a large-sized ink dryer is required. Moreover, the problem of a blot to highly minute printing is difficult, and since a limitation is in resolution, an application is restricted. Although solvent ink may be used from a quick-drying advantage, it cannot be said from the point of inflammability and environmental safety that it is desirable.

[0009] Although high-speed printing was possible for oily hot melt type ink, the printing-on property dot of ink was thick, and it was difficult to become about 10-20 microns and for scuff resistance to acquire the dependability after printing low.

[0010] If just desiccation of the front face by physical evaluation was enough as a water resisting property or the adhesion of ink was good, when it carried out the long term storage of the printed matter ***** since it has been judged, the method which stiffens recording ink with light, such as ultraviolet rays, had faults, such as flesh-side projection of ink and a ball up to dirt and the recorded body, just because it thought rapidity as important.

[0011] Since fading advanced by UV irradiation when addition uses an easy color for a coloring material, there was the need of hardening only a front face with minimum light exposure.

[0012] Moreover, when an organic pigment was used for the ink constituent for ink jets as a coloring agent, it had the fault of being easy to dissociate in the state of melting. Sedimentation of the particle distributed in liquid changes like common knowledge depending on the viscosity and the settling time of the particle size of a particle, and a dispersion-medium object, and the viscosity of a dispersion-medium object cannot sediment easily like hyperviscosity. On the other hand, it faced [printing with an ink jet printer, and], and the one where the viscosity of the ink to be used is lower is advantageous to improvement in the speed and densification, is suitable for high-reliability printing, and suited both property which conflicts mutually.

[0013] Since especially the ink jet recording method using the organic pigment as a coloring agent has many advantages compared with the ink jet recording method which used the color in respect of weatherability, it does not remain in office

printers, such as OA equipment, a printer for home use, and facsimile, but application is expected from the ornament of an indoor external use poster, a large-sized signboard, a vehicle, glass, an elevator, a wall, and a building, and the pan to the print to cloth etc. Especially the ink constituent of light and a thermal reaction mold does not choose the recorded body, but since high-speed color printing is possible, it can be used for production printers and an application spreads further. However, the problem that coexistence of a high-reliability quality of printed character, such as separation, storage stability, etc. of ink, was not obtained as mentioned above had become **** of commercial production.

[0014] This invention is to offer the ink constituent for ink jet printers which gives the record object of good quality by high-speed desiccation, and its printing mechanism.

[0015] The still more important purpose of this invention is to offer the pigment ink constituent for ink jet printers which is sufficient hypoviscosity excellent in pour stability for making an ink droplet inject from a detailed nozzle, and does not have separation and which aimed at this coexistence.

[0016]

[Means for Solving the Problem] The summary of this invention which solves the above-mentioned technical problem is in the ink jet record approach which forms an image using the ink constituent which has the property hardened by irradiating light, such as ultraviolet rays and an electron ray, to use the ink constituent and the record conditions that the peak value of the absorbance in wave number $810 \times 10^5 \text{ cm}^{-1}$ of the infrared spectrum of said formed image becomes 20% or less before an optical exposure.

[0017] Preferably, it is good for an ink constituent to contain a pigment one to 20.0% of the weight as a coloring material further including urethane acrylate.

[0018] In the united engineering center written by Kiyoshi Kato "an ultraviolet curing system" (Heisei 2), since the monomer and oligomer which are used for ultraviolet curing have a double bond, infrared analysis of the residual double bond is carried out, and a hardening reaction rate can be measured by computing the consumption. In order that an unsaturated bond (acrylic radical) may show a peak characteristic of $810 \times 10^5 \text{ cm}^{-1}$, a partial saturation radical survival rate is shown by the bottom type with the reinforcement. That is, claim 1 means that this numeric value is 20% or less.

[0019]

[Equation 1]

不飽和基残存率 = (照射後の組成物の二重結合の吸光度 / 未照射組成物の二重結合の吸光度) $\times 100$

[0020] In order to obtain the ink with good distributed stability in which a pigment cannot sediment easily, it is desired for viscosity to be more high. It is advantageous, if partial saturation radical concentration is made high for, raising the cure rate of photoreaction mold ink on the other hand. That is, generally polyfunctional monomer is suitable from the monofunctional monomer. Polyfunctional monomer also tends to treat skin irritation weakly compared with a monofunctional monomer. However, in the ink constituent for ink jet printers, viscosity becomes high, and the role of monomer original added as a reactant diluent is not played.

[0021] Moreover, the problem of an odor generates a hypoviscosity monomer.

[0022] In order to use it as ink, the suitable range was set up according to the property of a printer to viscosity, and this was usually 10 - 30 mPa-s, but when a pigment with low dispersibility was generally used for a solvent (vehicle) as a coloring agent, it was difficult to set up the conditions with which are satisfied of both viscosity range and both settling velocity.

[0023] In addition, there are many compendiums about an ultraviolet curing technique, and the work "UV and EV hardening technique" united engineering center (Showa 57) edited by the Imoto **** is mentioned.

[0024]

[Embodiment of the Invention] Hereafter, this invention is explained in full detail.

[0025] 20 or less mPa-s of viscosity of 4 - 15 mPa-s is [the vehicle component of this invention] preferably desirable. It is difficult to perform ink jet record which could not prevent sedimentation of a pigment in the viscosity of less than 4 mPa-s, but the addition was restricted in the viscosity exceeding 20 mPa-s, and was stabilized.

[0026] In order to form the stable ink dot, as for the surface tension in a room temperature, it is desirable that they are 18 or more mN/m.

[0027] Although a photo-setting resin monomer specifically occupies ten to 70 percentage by weight among an ink constituent It is the resin monomer of the comparison-hypoviscosity which has the partial saturation double bond in which a radical polymerization is possible in the molecular structure as an effective thing. For example, the 2-ethylhexyl (meta) acrylate of a monofunctional radical (EHA), 2-hydroxyethyl (meta) acrylate (HEA), 2-hydroxypropyl (meta) acrylate (HPA), Caprolactone denaturation tetrahydrofurfuryl (meta) acrylate, Iso BONIRU (meta) acrylate, 3-methoxy butyl (meta) acrylate, Tetrahydrofurfuryl (meta) acrylate, lauryl (meta) acrylate, 2-phenoxy ethyl (meta) acrylate, isodecyl (meta) acrylate, Iso octyl (meta) acrylate, tridecyl (meta) acrylate, Caprolactone (meta) acrylate, ethoxylation nonyl phenol (meta) acrylate, The tripropylene GURIKORUJI (meta) acrylate of two functional groups, TORIECHIRENGURIKORUJI (meta) acrylate, Tetra-ethylene GURIKORUJI (meta) acrylate, polypropylene GURIKORUJI (meta) acrylate, Neopentyl glycol hydroxy pivalate S TERUJI (meta) acrylate (MANDA) and hydroxy pivalate neopentyl glycol S TERUJI (meta) acrylate (HPNDA), 1,3-butane JIORUJI (meta) acrylate (BGDA), 1,4-butane JIORUJI (meta) acrylate (BUDA), 1,6-hexane JIORUJI (meta) acrylate (HDDA), 1, 9-nonane JIORUJI (meta) acrylate, Diethylene GURIKORUJI (meta) acrylate (DEGDA), neopentyl GURIKORUJI (meta) acrylate (NPGDA), Tripropylene GURIKORUJI (meta) acrylate (TPGDA), Caprolactone denaturation hydroxy pivalate neopentyl glycol S TERUJI (meta) acrylate, Propoxy-ized OPENCHIRUGURIKORUJI (meta) acrylate, ethoxy denaturation bisphenol A di (meth)acrylate, Polyethylene-glycol 200 di(meth)acrylate, polyethylene-glycol 400 di(meth)acrylate, The TORIMECHI roll pro pantry (meta) acrylate of a polyfunctional radical (TMPTA), Pen TAERISURITORUTORI (meta) acrylate (PETA), dipentaerythritol hexa (meta) acrylate (DPHA), Triaryl isocyanate, the acrylate of epsilon-caprolactone denaturation dipentaerythritol (meta), Tris(2-hydroxyethyl)isocyanurate tri(meth)acrylate, Ethoxylation TORIMECHI roll pro pantry (meta) acrylate, propoxy-ized TORIMECHI roll pro pantry (meta) acrylate, Propoxy-ized GURISERIRUTORI (meta) acrylate,

pentaerythritol tetrapod (meta) acrylate, Ditrimehtylol propane tetrapod (meta) acrylate, dipentaerythritol hydroxy PENTA (meta) acrylate, ethoxylation pentaerythritol tetrapod (meta) acrylate, PENTA (meta) acrylate ester, etc. are desirable.

[0028] Specifically KAYARAD TC-110S, KAYARAD R-128H, KAYARAD R-526, KAYARAD NPGDA, KAYARAD PEG400DA, KAYARAD MANDA, KAYARAD R-167, KAYARAD HX-220, KAYARAD HX-620, KAYARAD R-551, KAYARAD R-712, KAYARAD R-604, KAYARAD R-684, KAYARAD GPO, KAYARAD TMPTA, KAYARAD THE-330, KAYARAD TPA-320, KAYARADTPA-330, KAYARAD PET-30, KAYARAD RP-1040, KAYARAD T-1420, KAYARAD DPHA, KAYARAD DPHA-2C, KAYARAD D-310 and KAYARAD D-330, KAYARAD DPCA-20, KAYARADDDPCA-30, KAYARAD DPCA-60, KAYARAD DPCA-120, KAYARAD DN-0075, KAYARAD DN-2475, and KAYAMER PM-2, KAYAMER PM-21, the KS series HDDA, TPGDA, and TMPTA, the SR series 256, 257, 285, 335, and 339A, 395, 440, 495, 504, 111, 212, 213, 230, 259, 268, 272, 344, 349, 601, 602, 610, 9003, 368, 415, 444, 454, 492, 499, 502, 9020, 9035, 295, 355, 399E494, 9041203, 208, 242, 313, 604, 205, 206, 209, 210 and 214, 231E239, 248, 252, 297, 348, 365C, 480, 9036, 350 (Nippon Kayaku make), the beam set 770 (product made from the Arakawa chemistry), etc. can be used.

[0029] It can be used without acrylate, such as polyester system resin, acrylic resin, epoxy system resin, urethane system resin, an alkyd resin, ether system resin, and polyhydric alcohol, methacrylate, etc. limiting as a prepolymer.

[0030] Moreover, it can be used also about water soluble resin and emulsion type photo-curing mold resin.

[0031] Specifically KAYARAD UX SERIES 2201, 2301, 3204, 3301, 4101, 6101, 7101, and 8101, the KAYARAD R&EX series 011, 300, 130, 190, 2320, 205, 131, 146, and 280, and KAYARAD The MAX series 1100, 2100, 2101, 2102, 2203, 2104, 3100, 3101, 3510, and 3661 (Nippon Kayaku make), The beam sets 700, 710, 720, 750, 502H, and 504H, 505A-6, 510, 550B, 551B, 575, 261, 265, 267, 259, 255, 271, 243, 101, 102 and 115, 207TS, 575CB(s), AQ-7, AQ-9, AQ-11, EM-90, EM-92 (product made from the Arakawa chemistry), 0304TB, 0401TA, 0403kA, 0404EA, 0404TB, 0502TI0502TC, 102A, 103A, 103B, 104A, 1312MA, 1403EA, 1422TM, 1428TA, 1438MG, 1551MB, IBR-305, 1FC-507, 1SM-012, 1AN-202, 1ST-307, 1AP-201, 1PA-202, 1XV-003, 1kW-430, 1kW-501, 4501TA, 4502MA, 4503MX, 4517MB, 4512MA, 4523TI, 4537MA, 4557MB, 6501MA, 6508MG, 6513MG, 6416MA, 6421MA, 6560MA, 6614MA, 717-1, 856-5, QT 701-45, 6522MA, 6479MA, 6519MB, 6535MA, 724-65A, 824-65, 6540MA, 6RI-350, 6TH-419, 6HB-601, 6543MB, 6AZ-162, 6AZ-309, 6AZ-215, 6544MA, 6AT-203B, 6BF-203, 6AT-113, 6HY316, 6RL-505, 7408MA, 7501TE, 7511MA, 7505TC, 7529MA, MT 408-13, MT 408-15, MT 408-42, 7CJ-601, 7PN-302, 7541MB, 7RZ-011, 7613MA, 8DL-100, 8AZ-103, 5YD-420, 9504MNS, Akrit WEM-202U, 030U, 321U, 306U and 162, WBR-183U, 601U and 401U, 3D R-057, 829, 828 (TAISEI chemically-modified), etc. can be used.

[0032] Especially the optimal prepolymer for the purpose of this invention is urethane acrylate, and its rate of urethane and acrylic resin is [especially the prepolymer of 1:1] desirable. Urethane acrylate is a well-known ingredient in many good properties.

[0033] the most desirable one — akrit WBR— it is 829 and 828.

[0034] Printed matter storage stability with these sufficient as a principal component of the ink for ink jets is acquired. It has the reinforcement which can be equal to the fluidity at the time of ink melting being stable, and also grinding a printing image or bending.

[0035] A vehicle can mix and use at least one sort chosen from these, or two sorts or more. These are all excellent in adhesion to various adherend matter with the good and wide range wettability to a record medium.

[0036] Furthermore, water and a solvent may be added for hypoviscosity-izing and improvement in the speed. Each constituent of an ink constituent may be dissolved well, and as long as after printing evaporates promptly, which solvent is sufficient as it. For this reason, as for the solvent to be used, it is desirable to use a ketone and/or alcohol as the main solvent, for example, it is desirable independent or to use an acetone, a methyl ethyl ketone, methyl isobutyl ketone, a methanol, ethanol, isopropanol, etc. for a mixed pan as a partially aromatic solvent with water.

[0037] As a photoinitiator, it is 10 ***** rare ** from 0.01 percentage by weight among a vehicle total amount. For example, there are special groups, such as a benzoin ether system, an acetophenone system, a benzophenone system, a benzophenone, a thioxan ton system, other acyl phosphine oxide, and methylphenylglyoxylate, and benzoin alkyl ether, benzyl methyl ketal, hydroxy cyclohexyl phenyl ketone, p-isopropyl-alpha-hydroxy isobutyl phenon, 1, and 1-dichloro acetophenone, 2-chloro thioxan ton, etc. are chosen.

[0038] As an optical initiation assistant, triethanolamine, 2-dimethylamino ethyl benzoate, 4-dimethylamino isoamyl benzoate, polymerization nature tertiary amine, etc. are mentioned.

[0039] Specifically Vicure 10, 30, and 55 (Stow fur), KAYACURE BP-100, KAYACURE BMS, KAYACURE DETX-S, KAYACURE CTX, KAYACURE 2-EAQ, KAYACURE DMBI, KAYACURE EPA (Nippon Kayaku), The IRUGA cures 651, 184, 907, and 369 (Ciba-Geigy), DAROKYUA 1173, 1116, 953, 2959, 2273, and 1664 (Merck), SANDORE 1000 (sand), the counter cure CTX, the counter cure BMS, the counter cure ITX, the counter cure PDO, the counter cures BEA and DMB (WORD BURENKIN soup), SANKYUA IP and BTTP (Nippon Oil & Fats), etc. are desirable. In addition, photoinitiator content type photo-curing mold resin may be used.

[0040] The pigment which right-distributed to the above-mentioned vehicle as a coloring agent, and was excellent in weatherability is desirable. Necessarily highly, in addition, since manufacture of the particle dispersing element of homogeneity was difficult, when it was high concentration, the color enhancement (depth of shade per addition concentration) of the pigment used especially for this invention has the phenomenon in which melt viscosity increases superfluously, and was not conventionally put in practical use as ink for ink jets. Although not necessarily limited especially, organic [of the following number] or the inorganic pigment indicated by the Color Index can be used for this invention.

[0041] As red or a Magenta pigment Pigment Red 3, 5, 19, 22, 31, 38, 43, 48: 1 48: 2 48: 3 48: 4 48: 5 49: 1 53: 1 57: 1 57: 2 58: 4 63: 1, 81, 81:1, 81:2, 81:3, 81:4, 88, 104, 108, 112, 122, 123, 144, 146, 149, 166, 168, 169, 170, 177, 178, 179, 184, 185, 208, 216, 226, 257, and Pigment As Violet 3, 19, 23, 29, 30, 37, 50, and 88, Pigment Orange 13, 16, 20, and 36, blue, or a cyanogen pigment As pigment Blue 1, 15, 15:1, 15:2, 15:3, 15:4, 15:6, and 16, 17-1, 22, 27, 28, 29, 36 and 60, and a green pigment As Pigment Green 7, 26, 36, and 50 and a yellow pigment Pigment Yellow As 1, 3, 12, 13, 14, 17, 34, 35, 37, 55, 74, 81, 83, 93, 94, 95, 97, 108, 109, 110, 137, 138, 139, 153, 154, 155, 157, 166, 167, 168, 180, 185, 193, and black colors Pigment Black 7, 28, and 26 etc. can use it according to the purpose.

[0042] When a trade name is shown concretely, for example The KUROMO fine yellow 2080, 5900, and 5930, AF-1300, 2700L, KUROMO fine Orange 3700L and 6730, KUROMO fine Scarlett 6750, KUROMO fine Magentas 6880, 6886, and 6891N, 6790, 6887, KUROMO fine violet RE, the KUROMO fine red 6820 and 6830, KUROMO fine blue HS-3, 5187, 5108, 5197, 5085N, SR-5020, 5026, 5050, 4920, 4927, 4937 and 4824, 4933 GN-EP, 4940, 4973, 5205, 5208, 5214, 5221, 5000P, KUROMO fine Green 2GN, 2GO, 2G-550D, 5310, 5370 and 6830, the KUROMO fine black A-1103, Seika fast yellow 10G H, A-3, 2035, 2054, 2200, 2270, 2300, 2400 (B), 2500, 2600, ZAY-260, 2700(B), 2770, the Seika fast red 8040, C405 (F), CA120, LR-116, 1531B, 8060R and 1547, ZAW-262, 1537B, GY, 4R-4016, 3820 and 3891, ZA-215, and Seika — fast — carmine 6B1476T-7 — 1483 LT 3840, 3870, and Seika — fast — Bordeaux 10B-430, the Seika light rose R40, and the Seika light violet B — 800, 7805, and Seika fast MARUN 460N — Seika fast Orange 900 and 2900, Seika light blue C718, A612, cyanine blue 4933M, 4940 4933 GN-EP, 4973 (Dainichiseika Colour & Chemicals Mfg. make), KET Yellow 401, 402, 403, 404, 405, 406, 416, 424, KET Orange 501, KET Red 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 336, 337, 338, and 346, and KET Blue 101, 102, 103, 104, 105, 106, 111, 118, and 124 and KET Green 201 (product made from the Dainippon Ink chemistry), Colortex Yellow 301, 314, 315, and 316 and P- 624 and 314U — 10 GN U3 — GN, UNN, UA-414, U263, Finacol Yellow T-13, T-05, Pigment Yellow 1705 and Colortex Orange 202, Colortex Red 101, 103, 115, and 116, and D3B — It UFN(s), UCN(s) and UBN(s). P- 625, 102, and H-1024 — 105 C U3BN, URN, UGN, UG276, U456 and U457, 105C, USN, Colortex Maroon 601, Colortex Brown B610N, Colortex Violet 600 and Pigment Red 122, Colortex Blue 516, 517, 518, and 519, A818, and P- 908, 510, Colortex Green 402 and 403, Colortex Black 702, and U905 (product made from San-yo coloring matter) — Lionol Yellow 1405G, Lionol Blue FG7330 and FG7350, FG7400G, FG7405G, ES, ESP-S (Toyo Ink make), Toner Magenta E02, Permanent Rubin F6B, Toner Yellow HG, Permanent Yellow GG-02, Hostapam Blue B2G (product made from the Hoechst industry), Carbon black #2600, #2400, #2350, #2200, #1000, #990, #980, #970, #960, #950, #850, MCF88, #750, #650, MA600, MA7, MA8, MA11 and MA100, MA100R, MA77, #52, #50, #47, #45, #45L, #40, #33, #32, #30, #25, #20, #10, #5, #44, CF9, etc. are mentioned (Mitsubishi Chemical make).

[0043] Moreover, the dispersion liquid which carried out high concentration distribution of the pigment beforehand at water or a solvent can also be used. For example, MICROPIGMO WMBK-5, WMBE-5, WMRD-5, WMYW-5, AMBK-2, AMYW-2, AMBE-4 (product made from the ORIENT chemistry), etc. are mentioned.

[0044] 1 - 20 weight section of the addition of a pigment is optimum dose. Under in the 0.1 weight section, image quality deteriorates, and if [than 20 weight sections] more, it will have a bad influence on an ink viscosity property. Moreover, two or more kinds of coloring agents can be used by adjustment of a color etc., mixing timely.

[0045] Since functionality is further discovered to the ink constituent of this invention, various kinds of sensitizers, an optical stabilizing agent, a finishing agent, a surfactant, a viscosity low laxative, an antioxidant, an antioxidant, a bridge formation accelerator, polymerization inhibitor, a plasticizer, antiseptics, pH regulator, a defoaming agent, a moisturizer, a dispersant, a color, etc. are mixable.

[0046] Although a bead mill and a homogenizer are the the best for mixing of the component of the above-mentioned vehicle, a coloring agent, and others, and distribution, various kinds of well-known grinding or distributed equipment can use it without a limit especially.

[0047] As a means to harden the ink droplet of image formation, a (ultraviolet-rays UV) exposure lamp, an electron ray, heat, etc. are mentioned. Since heat may occur in a UV irradiation lamp and the recorded body may deform, it is desirable when a cooler style, for example, a cold mirror, a cold filter, work-piece cooling, etc. possess. As a class of lamp, there are a high pressure mercury vapor lamp, an ultrahigh pressure mercury lamp, metal halide, etc. Although an ultrahigh pressure mercury lamp is the point light source, the exposure of a short wavelength field is possible for the DeepUV type which made efficiency for light utilization high combining optical system. Since metal halide has the large wavelength field, it is effective in a coloring object. The halogenide of metals, such as Pb, Sn, and Fe, is used and it can choose according to the absorption spectrum of a photoinitiator. If it is a lamp effective in hardening, it can be especially used without a limit.

[0048] Furthermore, the device which put the direct drying equipment side by side for improvement in the speed can be used, and also it is effective to form oxygen cutoff film, such as polyvinyl alcohol, in order to make hardening efficient, and to make it irradiate from it.

[0049] The balance of many important factors is needed for preparation of the ink for ink jets of high quality. The ink of this invention satisfies some well-known requirements, in order to apply to an ink jet printer. That is, this ink has stability sufficient at a room temperature, and dependability is in the image quality after the storage before printing, and printing. After adhesion hardening has sufficient transparency and saturation in a record medium, and a uniform thin film is formed, and the printed matter of good image quality is given. These requirements are complicated, although it cannot necessarily evaluate clearly about the ink of this invention, it is in the condition which piled up printed matter also in the state of 40-degree-C storage, for example, and it is required for offset not to occur.

[0050] It is desirable to pass the trial below 3mmphi below 5mmphi especially in the mandrel test using the transparency film as a bending property of printed matter. The viscosity at the time of injection is 5 - 30 mPa-s, and 18 or more mN/m of surface tension is desirable. Few things of the volume change in the case of hardening are desirable. Moreover, it is required to be a constituent with the high safety which considered an environment and the body.

[0051] Furthermore, this constituent is usable also to the high speed printer of all types with the printer, conventionally well-known an ink jet printer, for example, the printer for office, currently used for industrial use marking which makes an ink globule inject, a wide format mold printer, a lithographic plate and the printer for platemaking, a Label Printer, and this typical actuation, only when printing is needed. Since high-speed desiccation is possible, as a record medium, paper, plastic film, a capsule, gel, a metallic foil, glass, wood, cloth, etc. are mentioned, but because non-contact printing is possible, the configuration of a medium can use an extensive thing and is not limited to this.

[0052] Next, although an example explains this invention concretely, it is not limited to a written example.

[Example 1] As a vehicle urethane acrylate (the product made from the TAISEI-ized **, trade name: akrit WBR-829) The 100 weight sections, and — as a coloring agent — a cyanogen pigment water dispersing element (product made from ORIENT chemistry, trade name: MICROPIGMO WMBE-5) Hierro pigment water dispersing element (the product made from the ORIENT chemistry —) Trade name : MICROPIGMO WMYW-5 is distributed, respectively until homogeneous mixture is obtained by

rotational frequency 2,000rpm using a homogenizer (Hitachi Koki HG30) in a total of 300g of mixture of 20 weight sections. Then, it filtered, the impurity etc. was removed and the homogeneous ink constituent was obtained. A result is shown in Table 1.

[0053]

[Table 1]

区分	実 施 例				比較例
インク組成\No. (重量部)	1		2		1
アクリットWBR-829	100	100			
ビームセット575CB			40	40	40
ビームセット770			60	60	60
イルガキュア369			4	4	
MICROPIGMO WMBE-5	20				
MICROPIGMO WMYW-5		20			
MICROPIGMO AMBK-2			1		
MICROPIGMO AMRD-2				1	
ZAPON Blue 807					5
粘度 (mPa・s)	10	12	12	11	11
顔料分離 (%)	0	0	0	0	—
不飽和基残存率 (%)	5	4	20	15	—
ラビングテスト (MEK)	○	○	○	○	—

[0054] When viscosity was measured using the rotational viscometer (TOKIMEC EDL model), they were 10 and 12 mPa-s.

[0055] Separation was looked at by neither of the dispersion liquid, when ink was put into the test tube of 12mmphi, it was left for three days at the room temperature and separation (it is % display about a separation rate) of an ink layer was observed.

[0056] Moreover, moving a form with a fixed speed, this ink constituent was made to breathe out with an ink jet printer, and, subsequently the quantity of light of 1100 mJ/cm² was immediately irradiated with the black light (the USHIO make, UVC-1212/1MNLC3-AA04).

[0057] Some hardened film was fabricated to the tablet with potassium-bromide (KBr) powder, and the infrared analysis apparatus (the product made from BIO RAD, FTS-40A) performed spectrometry.

[0058] Moreover, it computed from the peak intensity of 810cm⁻¹ by [several 1] which mentioned above the partial saturation radical survival rate of each ink. The partial saturation radical survival rates of the ink constituent were 5 and 4%, respectively as this result was shown in Table 1. Moreover, also after these ink attaches 1kg weight and carries out the rubbing test of the gauze in which the methyl ethyl ketone (MEK) was included, it is changeless, and it showed good dry-hard nature.

[Example 2] As a vehicle urethane acrylate (the product made from the Arakawa chemistry, trade name:beam set 575CB) 40 weight sections, the beam set 770 — 60 weight sections and a photoinitiator (the Ciba-Geigy make —) Trade name : The IRUGA cure 369 is used as 4 weight sections and a coloring agent. A black pigment dispersing element (the product made from the ORIENT chemistry, trade name:MICROPIGMO AMBK-2), and a Magenta pigment dispersing element (the product made from the ORIENT chemistry, trade name:MICROPIGMO AMRD-2), respectively a total of 300g of mixture of 1 weight section Using the homogenizer (Hitachi Koki HG30), it distributed until homogeneous mixture was obtained by rotational frequency 2,000rpm, and it filtered continuously, the impurity etc. was removed, and the homogeneous ink constituent was obtained. A result is shown in Table 1.

[0059] When viscosity was measured using the rotational viscometer (TOKIMEC EDL model), they were 12 and 11 mPa-s. Separation was looked at by neither of the dispersion liquid, when ink was put into the test tube of 12mmphi, it was left for three days at the room temperature and separation (it is % display about a separation rate) of the Inn layer was observed. Moreover, moving a form with a fixed speed, this ink was made to breathe out with an ink jet printer, and, subsequently the quantity of light of 100 mJ/cm² was immediately irradiated with the black light (the USHIO make, UVC-1212/1MNLC3-AA04).

[0060] Some hardened film was fabricated to the tablet with potassium-bromide (KBr) powder, and the infrared analysis apparatus (BIO RAD company make, FTS-40A) performed spectrometry.

[0061] Moreover, it computed from the peak intensity of 810cm⁻¹ by [several 1] which mentioned above the partial saturation radical survival rate of each ink. The partial saturation radical survival rate was [the partial saturation radical survival rates of the ink constituent] 20 and 15% as this result was shown in Table 1. Moreover, also after these ink attaches 1kg weight and carries out the rubbing test of the gauze in which the methyl ethyl ketone (MEK) was included, it is changeless, and it showed good dry-hard nature.

[Example 1 of a comparison] As a vehicle urethane acrylate (the product made from the Arakawa chemistry, trade name:beam set 575CB) 40 weight sections, the beam set 770 — 60 weight sections and a photoinitiator (the Ciba-Geigy make, a trade name: IRUGA cure 369) — 4 weight sections and a coloring agent — carrying out — a blue color (the BASF make —) Trade name: It filtered by having agitated and (about 0.5 hours) continued, the impurity etc. was removed, and the homogeneous cyanogen ink prototype was obtained until homogeneous mixture was obtained [ZAPON Blue /807] by the magnetic stirrer (the product made from IUCHI, HMS-5S) in a total of 300g of 5% of the weight of mixture. A result is shown in Table 1.

[0062] When viscosity was measured using the rotational viscometer (TOKIMEC EDL model), it was 11 mPa-s. The solubility of a color was good.

[0063] Moreover, although this ink was made to breathe out with an ink jet printer and the quantity of light of 100 mJ/cm² was subsequently immediately irradiated with the black light (the USHIO make, UVC-1212/1MNLC3-AA04), moving a form with a fixed speed, it was fading green. Since it faded even if it lowered the quantity of light to 20 mJ/cm², it did not result in calculation of the partial saturation radical survival rate by infrared analysis.

[0064]

[Effect of the Invention] Since the ink constituent for ink jet printers of this invention was excellent in lightfastness and a water resisting property compared with the ink which coexistence of coloring agent distribution stability and an injection property was achieved, and used the color as the main coloring agent in order to improve quick-drying [of ink] and preservation stability which were made into the problem and to use a pigment as a coloring material further, when carrying out high-speed printing conventionally, the demand of rapidity and a low price was filled and manufacture of ink with a large application was attained.

[Translation done.]

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(54) [発明の名称] インクジェット記録方法

(57) [要約]

【課題】 高速、高信頼性印字品質および高信頼性を図ったインクジェット記録方式に用いるインク組成物の提供。

【解決手段】 紫外線や電子線等の光を照射することにより硬化する特性を有するインクジェットインクにおいて、紫外線スベクトル810±5cm⁻¹の吸光度のピークが照射前の2.0%以下になるインク組成物あるいは記録条件を用いる。また、組成物のひとつがレタナフリレートであり、色剤として顔料を1〜2.0重量部含むインク組成物とする。

(2)

【特許請求の範囲】

【請求項1】 紫外線や電子線等の光を照射することにより硬化する特性を有するインク組成物を形成するインク組成物のインクジェット記録方法において、前記形成された画像の紫外線スベクトルの波数810±5cm⁻¹における吸光度のピーク値が照射前の2.0%以下となるインク組成物及び記録条件を用いることを特徴とするインクジェット記録方法。

【請求項2】 前記インク組成物がレタナフリレートを含み、更に色剤として顔料を1〜2.0、0重量%含むことを特徴とする請求項1記載のインクジェット記録方法。

【発明の詳細な説明】

【0001】 本発明は、例えばインクジェット記録装置に用いられるインク組成物に関する。

【0002】

【従来の技術】 従来よりインクジェット記録用インク組成物としては、水溶性液体インク組成物が広く使われている。また、室温で固体のワックス等を素材としたホットメルト型インク組成物を用いて、加熱等により硬化し、何らかのエネルギーを加えて噴射させ、記録媒体上に付着しつつ冷却固化し記録ドットを形成するホットメルト型インクジェット記録方式が提案されている。

【0003】 このインクは室温で固体状であるため取扱い時に汚れないし、また、溶融時のインクの蒸発量を最小限にできるためノズルの目詰まりがない。更に、付着後直ちに固化するため「にじみ」もなく、和紙から顔用紙、葉書といったさまざまな記録媒体を前処理等なしで用いることができる等の利点がある。米国特許第4,391,369号、4,484,948号には、紙質に関係なく良好な印刷品質を提供するインク組成物が記述されている。

【0004】 また、特開昭56-9376号公報においては、金属面に接着性の良い紫外線硬化樹脂型インキ組成物が開示されており、更に、紫外線を露光することによって硬化するインクジェット記録用インクとして、米国特許第4,228,438号に開示されているように、エポキシ変性アクリル樹脂およびウレタン変性アクリル樹脂をインクダートとして使用し、かつ5ミクロン以下の粒子径の顔料を着色成分としたインク、あるいは特開昭58-3674号公報に開示されているカチオン重合性のエポキシ樹脂をインクダートに用いたインク、特開平5-186725号公報に記載されているように、水溶性または非水溶性染料を使用したものがあり、普通紙、再生紙への印字を容易にしたものが開示されている。

【0005】 一方、フラスチック基板への画像形成方式としては、特開昭52-142516号公報に記載されているように、紫外線硬化型樹脂に昇華性染料を用いたものがある。特開平9-183927号公報には、インクジェット記録方式でインクを塗布する紫外線硬化型樹脂組成物

が開示されている。特開平9-165540号公報では、顔料と紫外線硬化樹脂を含む水系インクによりノズルの目詰まりをなくしたものが開示されている。

【0006】 他方、印刷物の耐水性を向上するために、インクの着色剤として顔料を用いることが一般的で、レザプリンタ、溶融転写型プリンタ、液体インクジェットプリンタ及びソリッドインクジェットプリンタ等の各種のプリンタのインクとして使用されている。

【0007】 例えば、顔料インクに関して、特開平3-37278号、特開平4-339871号、特開平5-16343号、特開平5-105832号、特開平6-49400号、特開平6-228479号、特開平6-228480号、特開平6-306319号、特開平7-109432号、特開平7-196968号、特開平7-278477号、特開平7-306319号、特開平7-316479号、特開平7-331141号、特開平9-29586号、公報等多くの報告がなされている。

【0008】

【発明が解決しようとする課題】 前記水系インクを印刷に用いた場合、インク吸収性のない被記録体に対しては印刷が困難で、専用紙を使用する場合にも大型のインク乾燥装置が必要である。また、にじみの問題から高精細印刷は困難で解像度に限界があるため用途が限られる。速乾性の利点から溶剤インクが使用される場合があるが、可燃性および環境安全性の点から望ましいとは言えない。

【0009】 ホットメルトタイプの油性インクは高速印刷が可能であるが、インクの性質上印字ドットが厚いもので10〜20ミクロン程度になり、耐水性が低く印刷後の信頼性を得るのが難しかった。

【0010】 紫外線等の光で記録液を硬化させる方式は、高速性を重視するあまり、物理的解面による表面の乾燥のみで耐水性が十分であるとか、インクの付着性がよいとか判断されてきたため、印刷物値が重なるを長期保管する際に、インクの黄変りやよごれ、被記録体への張り付き等の欠点を有していた。

【0011】 色剤に添加が容易な染料を用いた場合は、紫外線照射により退色が進行するため、最低限の露光量で表面だけを硬化する必要性があった。

【0012】 また、インクジェット用インク組成物に有機顔料を着色剤として用いた場合は、溶融状態で分離しやすという欠点を有していた。液中に分散した粒子の沈降は、周知のごとく、粒子の粒径、分散媒体の粘度及び沈降時間に依存して変化し、分散媒体の粘度は高粘度ほど沈降しにくい。一方、インクジェットプリンタで印刷を実施するに際しては、使用するインクの粘度はより低い方が高速化、高密度化に対して有利で高信頼性印刷に適しており、両者は互いに相反する特性にあった。

【0013】 有機顔料を着色剤として用いたインクジェット記録方式は、特に耐水性の面で染料を用いたインクジェット記録方式に比べて多くの利点があるので、OA

機器、一家庭用エアコン、フリアミニ等オアシスリソにたとえまです室内外用マスター、大型看板、車、ガラス、エレベーター、壁および建物の装飾、さらには布へのエアコンなどへ応用が期待されている。特に、光および熱伝達型のエアコン組成物は、被加工媒体を飛ばす高速カメラ印刷が可能であるため、フリアミニョンエアコン用などにも使用が期待であり用途は更に広がる。しかし、前記のようにエアコンの分譲及び価格安定性など高信頼性商品品質の両立が得られないという問題が製品化の隘路となっていた。

【0014】本発明は、高連な乾燥により良好な品質の記録物を与えるインクジェットプリンタ用インク組成物及びその印字機構を提供することにある。

【0015】本発明の更に重要な目的は、微細なノズルからインク滴を噴射させるに十分な、流動安定性に優れた低粘度かつ分離のよい、この面を因ったインクジェットプリンタ用顔料インク組成物を提供することにある。

【0016】

【課題を解決するための手段】上記課題を解決する本発明 * 20 【教1】
不飽和基残存率=(照射後の組成物の二重結合/未照射組成物の

$$\text{二重結合の吸光度}) \times 100$$

【0020】顔料が沈降しにくい分散安定性の良好なインクを得るためには、粘度はより高いことが望まれる。

一方、光応型イソンの硬化速度を高めるには不飽和基濃度を高くとることで有利である。つまり一般的には、単官能モノマーよりも多官能モノマーのが適している。多官能モノマーは単官能イソンに比べて皮膚刺激性も弱く扱いやすい。しかし、イソンがゼリーソニック用イソック組成物においては粘度が高くなり、反応性希釈剤として添加するモノマー本来の役割を果たさない。

【0021】また、低粘度モノマーは臭気の問題が発生する。

【0022】 イソクとして使用するためには、粘度に対して適当な範囲がソリソク特性に応じて設定され、これは通常10〜30mPa・sであるが、着色剤として一般に溶媒（ビニル）に分散性の低い顔料を用いた場合、粘度範囲と溶解速度の両者を共に満足する条件を設定することが困難であった。

【0023】なお、紫外線硬化技術については多くの成書があり、井本総ら編著「UV・E.V硬化技術」総合技術センター（昭和57年）が挙げられる。

【0024】

【発明の実施の形態】以下、本発明について詳述する。
 【0025】本発明のどヒノ成分は、粘度が20 mPa・s以下、好ましくは4～15 mPa・sが望ましい。4 mPa・s未満の粘度では顔料の沈降を防止できず、20 mPa・sを超える粘度では添加量が制限され安定したインクジェット記録を行うことが困難である。

【0026】安定したインクドットを形成するために

* 明の要旨は、紫外線や電子線等の光を照射することにより硬化する特性を有するイオン組成物を用いて、面硬化を形成するイオンジェット記録方法において、前記面硬化を形成するイオンジェットの波数 $8.10 \pm 5 \text{ cm}^{-1}$ における吸光度のピーク値が光照射前の 5.0% 以下となるイオン組成物及び記録条件を用いることにある。

【0017】好ましくは、インク組成物がウレタンアクリレートを含み、更に色料として顔料を1〜20.0重量%含むとよい。

【0018】加藤清規著「紫外線硬化にスランム」総合技術センター（平成2年）では、紫外線硬化に使用するモノマーおよびオリゴマーは二重結合を持っているので、残存二重結合を赤外分析し、その消費を算出することで、硬化反応速度を測定できる。二重結合（ $\nu_{\text{C}=\text{C}}$ ）は $810 \pm 5 \text{ cm}^{-1}$ に特徴的なピークを示すため、その強度により不飽和基含有率は下式で示される。すなわち、請求項1はこの数値が20%以下であることを意味する。

【6100】

20 【数1】
二重結合の吸光度／未照射組成物の
(%) $\times 100$

は、室温における表面張力は18 mN/m以上であることが望ましい。

【0027】具体的には、イソク組成物中、光硬化性増粘モノマーは10〜70重量パーセントを占めるが、有効なものとしては、分子構造中にラジカル取合可能な不飽和二重結合を有する比較的低温の増粘モノマーで、例えば、単官能基の2-エチルヘキシル（メタ）アクリレート（EHA）、2-ヒドロキシエチル（メタ）アクリレート（HEA）、2-ヒドロキシプロピル（メタ）アクリ

レート (HPA)、カゾロクトン変性トリビプロフル
 フリル (メタ) アクリレート、イソボニル (メタ) アク

リレート、3-メトキシベンジル (メタ) アクリレート、
テトラヒドロフルフリル (メタ) アクリレート、ラウリル
ル (メタ) アクリレート、2-フェノキシエチル (メ
タ) アクリレート、イソデシル (メタ) アクリレート、
イソオクチル (メタ) アクリレート、トリデシル (メ
タ) アクリレート、カプロラクトン (メタ) アクリレー

40 ト、エトキシ化ニルフェノール（メタ）アクリレート、二官能基のトリクロビソグリコールジ（メタ）アクリレート、トリエチレングリコールジ（メタ）アクリ

レート、テトラエチル鉛（メタ）アクリル

ート、ボリアロビシナリコールジ (メタ) アクリレート、ネオペンチルグリコールとドロキシンペンテニ酸エステルジ (メタ) アクリレート (MANDA およびドロキシジペンテニ酸ネオペンチルグリコールエステルジ (メタ) アクリレート (IPNDA)、1, 3-ブタジエンジ (メタ) アクリレート (BGDA)、1, 4-ブタジエンジ (メタ) アクリレート (BUDA)、1, 6-ヘ

キサソジオールジ (メタ) アクリレート (HDDA)、1,
9-ノナソジオールジ (メタ) アクリレート、ジェチ
ソグリコールジ (メタ) アクリレート (DEGDA)、ネオ

ベンチタグリコールジ (メタ) アクリレート (NPGD A)、トリオロビシタグリコールジ (メタ) アクリレート (TPGD)、カテロラクトイン変性ビスベンチタグリコールジ (TPGD)、カテロラクトイン変性ジベンチタグリレート、プロポキシ化ベンチタグリコールジ (メタ) アクリレート、エトキシ変性ビスフェノールAジ (メタ) アクリレート、ポリエチレングリコール200ジ (メタ) アクリレート、ポリエチレングリコール400ジ (メタ) アクリレート、多官能基のトリメチロールプロペントールトリ アクリレート (TPMPA)、ベンタエリスリトールトリ (メタ) アクリレート (PEPA)、ジベンタエリスリトールヘキサ (メタ) アクリレート (OPHA)、トリリルメジタネート、 ϵ -カテロラクトイン変性ジベンチタグリコールの、 ϵ -カテロラクトイン変性ジベンチタグリコールの、メタアクリレート、トリス (2,2,2-トリフルオロエチル) イソシアレートトリ (メタ) アクリレート、エトキシ化トリメチロールプロペントールトリ アクリレート、プロポキシ化トリメチロールプロペントールトリ (メタ) アクリレート、プロポキシ化トリセリトリ (メタ) アクリレート、ベンタエリスリトールトリ (メタ) アクリレート、ジトリメチロールプロペントラ (メタ) アクリレート、ジベンタエリスリトールトリ (メタ) アクリレート、エトキシ化ベンチタグリコールジ (メタ) アクリレート、エトキシ化ベンタエリスリトールトリ (メタ) アクリレート、ベンタエリスリトールトリ (メタ) アクリレート、ベンタエリスリトールトリ (メタ) アクリレート等が好ましい。

【0028】具体的には、KAYARAD TC-110S、

—128H, KAYAKARD R-526, KAYAKARD NEGDA, KAYAKARD PEGDA,
ODA, KAYAKARD MANDA, KAYAKARD R-167, KAYAKARD HX-222
0, KAYAKARD HX-620, KAYAKARD R-551, KAYAKARD R-712,
KAYAKARD R-604, KAYAKARD R-684, KAYAKARD GP0, KAYAKARD
TPTA, KAYAKARD THE-330, KAYAKARD TPA-320, KAYAKARD
A-330, KAYAKARD PET-30, KAYAKARD RP-1040, KAYAKARD
1420, KAYAKARD DPHA, KAYAKARD DPHA-2C, KAYAKARD D-3

0, KAYARAD D-330, KAYARAD DPCC-20, KAYARADDPCC-3
0, KAYARAD DPCC-60, KAYARAD DPCC-120, KAYARAD DN-2475, KAYARAD DN-2475, KAYAMER PM-2
1, KS-3-1-2H00A, TPEGA, TUPFA, SR-3-1-2X266;
7, 285, 335, 339A, 395, 440, 495, 504, 111, 212,
13, 230, 259, 268, 272, 344, 349, 601, 602, 610,
003, 368, 415, 444, 454, 492, 499, 502, 9020, 9020

5、295、355、399E494、904I203、208、242、313、60
4、205、206、209、210、214、231E239、248、252、2
7、348、356C、480、9036、350（日本化薬製）、Eー
セツト770（荒川化学製）等が使用できる。

【0029】アレポリマーとしてはポリエ

脂、アクリル系樹脂、エポキシ系樹脂、ウレタン系樹脂、アルキッド樹脂、エーテル系樹脂、多価アルコール等のアクリレート、メタアクリレート等が限定すること

なく使用できる。

【0030】また、水溶性樹脂およびエマルジョンタイプの光硬化型樹脂についても使用できる。

【0031】具体的には、KAYARAD UXシ

01、3204、3301、4101、6101、7101、8101、KAYARAD
EX371-ス011、300、130、190、2220、205、131、14
6、280、KAYARAD MAX371-ス1100、2100、2101、210
2、2203、2104、3100、3101、3510、3661(日本化学
製)、ピーエムセツP700、710、720、750、502H、504H、
054-6、510、550S、551R、575、261、265、267、259
55、271、243、101、102、115、2077S、04-7
Q-9、AQ-11、EK-90、EK-92(荒川化学製)、0307C、AQ-
7A、0403KA、0404FA、0404TR、05027105027C、102A、
3A、103R、104A、1312MA、1403EA、1422TM、1428TA、
38MC、1551MR、1BR-30S、1FC-507、1SW-012、1AN-200C
ST-307、1AP-201、1PA-202、1XY-003、1KW-430、1KW-
1、1450TTA、4502MA、4503MA、4517MR、4512MA、45233C
I、4432TM、4557MR、6501MA、517-01、856-5、97101-
A、6422MA、6567MA、6614AM、7108-1、856-5、97101-
5、6522MA、6473MA、6519MS、6533MA、724-65A、824-
5、6540MA、6R1-350、6TH-419、61B-601、6543MR、6A、
162、6A7-309、6A7-215、6544MA、6A7-203B、6B6-202
6A7-113、61W31B、6R1-505、7404MA、7501TE、7511TE、
7505TC、7529MA、M7408-13、M7408-15、M7408-42、7
7505TC、7529MA、M7408-13、M7408-15、M7408-42、7
601、77N-302、7541MR、7R2-011、7613MA、80L-100、
Z-103、51D-420、9504ANS、テグリスTWE3-202L、030
U、321U、306U、162、WR-183U、601U、401U、30R-0
7、829、828(大誠化工)等が使用できる。

【00032】特に、本発明の目的に最適なテグリスマ
スはケラテングラチレート、ケラチンとテグリス樹脂
割合が1:1のテグリスマスを特に望ましい。ケラチ
ングラチレートは多くの良好な特性において周知の材料
ある。

【00033】最も望ましいのは、テグリスTWR-
29、828である。

【00034】これらはテグリスエツト用インソクの生成
として十分な印刷物保管安定性を得られる。インソク溶
時の流動性が安定している他に、印刷面像を磨ったり
り曲げたりすることに耐える強度を持っている。

【00035】ビヒクルはこれらの中から選ばれる少ない
と。1種、または2種以上を混合して用いることができ
る。これ、またはいずれも記録媒体へのめけ性が良好で広
間の各種複合媒体物質に対して感敏性に優れる。

【00036】更に、低粘度化および高速化のために水
よび溶剤を添加しても良い。インソク組成物の構成成分
いずれも良く溶解でき、用半液は速やかに蒸発するも
であればよい。溶剤の選択は、このために使用する
剤は、ケトソおよび/またはアルコールを主溶剤とする
のが好ましく、例えば、アセトン、メチルエチルケト
ン、メチルイソブチルケトン、メタノール、エタノー

【0033】最も望ましいのは、アクリツトWBR-29、828である。

【0034】これらは、インクジェット用インクの生成に十分な印刷物保管安定性を与えられる。インク溶時の流動性が安定している他に、印刷画像を熱たりり曲げたりすることに対する強度を持っている。

【0035】さらにこれらは、これらの中から選ばれる少なくとも1種、または2種以上を混合して用いることがでる。これらはいずれも記録媒体へのぬれ性が良好で広

困の各種被着体物質に対し密着性に優れる

【0036】更に、低粘度および高温化のために水より溶剤を添加しても良い。ソノラ組成物の構成成分いずれも良く溶解され、即ち溶媒は速やかに蒸発するものであればよい。溶剤として良い。このために使用する剤は、ケトソおよび/またはアルコールを主溶剤とするのが好ましく、例えば、テセト、メチルエチルケトン、メチルソソチルケトン、メタノール、エタノール

(7)

成分	実 施 例		比較例
	1	2	1
インク組成\No.	(重量部)		
アクリトWR-829	100	100	
ビーマセツト575CB		40	40
ビーマセツト770		60	60
イルガキュア369		4	4
MICROPiGMO WMBE-5	20		
MICROPiGMO WMYW-5		20	
MICROPiGMO AMBK-2		1	
MICROPiGMO AMRD-2			1
ZAPON Blue807			5
粘度 (mPa・s)	10	12	11
固料分濃 (%)	0	0	0
不飽和基残存率 (%)	5	4	20
ペンダスト (MEK)	○	○	○

【0054】粘度を回転粘度計（トキメック製EDLモジュール）を用いて測定したところ、1.0および1.2mPa・sであった。

【0055】インクを1.2mmφの試験管に入れ、室温で3日間放置して、インク層の分離（分離割合を%表示）を観察したところ、どちらの分散液にも分離は見られなかった。

【0056】また、用紙を一定の速さで移動させながら、このインク組成物をインクジェットプリンタにて吐出させ、次いで直ちに紫外線照射装置（ウシオ電機製、UVC-1212/1MNC3-AA04）で1.0mJ/cm²の光量を照射した。

【0057】硬化した膜の一部を臭化カリウム（KBr）粉末とともに錠剤に成形し、赤外分析装置（BIO RAD社製、FTS-40A）により吸光度測定をおこなった。

【0058】また、810cm⁻¹のピーク強度から、各インクの不飽和基残存率を前述した（数1）により算出した。この結果は表1に示しているように、インク組成物是不飽和基残存率がそれぞれおおよそ4%であった。また、これらのインクはメチルエチルトリソル（MEK）を含ませたガーゼを1kgの重りをつけてラビンガラスした後でも変化が全くなく、良好な硬化乾燥性を示した。

【実施例2】ビヒクルとしてウレタンアクリレート（荒川化学製、商品名：ビーマセツト575CB）を4.0重量部、ビーマセツト770を6.0重量部、光開始剤（チバガイギー製、商品名：イルガキュア369）を4重量部および着色剤としてアクリル顔料分散体（オリエント化学製、商品名：MICROPiGMO AMBK-2）およびペンダスト顔料分散体（オリエント化学製、商品名：MICROPiGMO AMRD-2）をそれぞれ1重量部の混合物全3.00gをホモジナイザ（日立工機製HG30）を用いて、回転数2,000rpmで均質な混合物が得られるまで分散し、続いてろ過を行

13

果を表1に示す。

【0062】粘度を回転粘度計（トキメック製EDLモジュール）を用いて測定したところ、1.1mPa・sであった。染料の溶解性は良好であった。

【0063】また、用紙を一定の速さで移動させながら、このインクをインクジェットプリンタにて吐出させ、次いで直ちに紫外線照射装置（ウシオ電機製、UVC-1212/1MNC3-AA04）で1.0mJ/cm²の光量を照射したが、緑色に退色していた。光量を2.0mJ/cm²に下げても退色したため、赤外分析による不飽和基残存率の算出に

(8)

は至らなかった。

【0064】

【発明の効果】本発明のインクジェットプリンタ用インク組成物は、従来迅速印刷する場合に問題とされていたインクの不乾性および保存安定性が改善され、更に色剤として顔料を用いるため、着色剤分散安定性と噴射特性の両立が図られ、染料を主着色剤としたインクに比べ耐光性および耐水性に優れているため、高速度および低価格の要求を満たし、用途が広いインクの製造が可能にな

14

フロントページの続き

Fターム(参考)

20056 EA01 EA04 EA21 FC02

21006 BA02 BA55 BA59 BA62

4J039 AD10 AD04 BE01 BE12 BE27

EA06 EA08 EA10 EA29 EA44

GA24

30

【0060】硬化した膜の一部を臭化カリウム（KBr）粉末とともに錠剤に成形し、赤外分析装置（BIO RAD社製、FTS-40A）により吸光度測定をおこなった。

【0061】また、810cm⁻¹のピーク強度から、各インクの不飽和基残存率を前述した（数1）により算出した。この結果は表1に示しているように、インク組成物是不飽和基残存率が不飽和基残存率が2.0および1.5%であった。また、これらのインクはメチルエチルトリソル（MEK）を含ませたガーゼを1kgの重りをつけてラビンガラスした後でも変化が全くなく、良好な硬化乾燥性を示した。

40

【比較例1】ビヒクルとしてウレタンアクリレート（荒川化学製、商品名：ビーマセツト575CB）を4.0重量部、ビーマセツト770を6.0重量部、光開始剤（チバガイギー製、商品名：イルガキュア369）を4重量部および着色剤として青染料（BAS F製、商品名：ZAPON Blue 807）を5重量%の混合物全3.00gをマグネチックスター（イナテック製、HMS-5S）により、均質な混合物が得られるまで攪拌（約0.5時間）し、続いてろ過を行い不純物等を除去し、均質なインク類似物を得た。結

60

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